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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/681,838	06/14/2001	Peter Jurgen Rohl	RD-28355/USA	2850

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EXAMINER
GARCIA OTERO, EDUARDO

ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 01/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	09/681,838	ROHL, PETER JURGEN
	Examiner	Art Unit	
	Eduardo Garcia-Otero	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>14 June 2004</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-20</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>14 June 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION: Non-Final (first action on the merits)

Introduction

1. Title is: Method of Analyzing Turbine Engine Disks.

2. First inventor is: Rohl.

3. Claims 1-20 are pending.

4. US Application was filed 6/14/2001, and priority is claimed to provisional application filed 9/5/2000.

Index of Important Prior Art

5. Rassaian refers to US patent 6,813,749.

6. Marcos refers to US Patent 5,133,182.

7. Time-Life Artificial Intelligence refers to Artificial Intelligence (Understanding Computers), by Time-Life Books, 1986, ISBN 0-8094-5675-3, pages 36-43.

Definitions

8. **"Assembly functionality"** is defined as "the ability of a CAD system to handle spacial relationships between parts.... Unigraphics ™... to simplify discretization for engineering analysis" at Specification page 5.

9. **"Chunking"** is defined as "subdividing the associative copy of the geometry into a collection of simple shapes (e.g., for example six-sided volumes) where the Boolean sum of the simple shapes makes up the original shape and where each shape contains the full information of the parent geometry. It will by appreciated by one of ordinary skill in the art that the spacial relationship between the geometries of the master model and the simple shapes of the context model is attained by using a method of assembly functionality" at Specification page 5.

10. **"Discretization"** is defined as "subdividing the parametric shape into pieces small enough to field quantities of interest to be approximated by using polynomials, for example. Types of discretization, may include, but are not limited to, meshing used in finite element analysis (FEA programs or gridding used in computational fluid dynamics (CFD) programs" at Specification page 5.

11. **"Finite difference"** is defined as "[MATH] the difference between the values of a function at two discrete points, used to approximate the derivative of the function" by The McGraw-

Hill Dictionary of Scientific and Technical Terms, Fourth Edition, by McGraw-Hill

Companies, Inc., ISBN 0-07-05270-9, 1989.

12. **"Macros"** are defined as "a symbol, name, or key that represents a list of commands, actions, or keystrokes" at Specification page 4.

13. **"Optimization"** is defined as "[MATH] The maximizing or minimizing of a given function possibly subject to some type of constraints. [SYS ENG] 1. Broadly, the efforts and processes of making a decision, a design, or a system as perfect, effective, or functional as possible. 2. Narrowly, the specific methodology, techniques, and procedures used to decide on the one specific solution in a defined set of possible alternatives that will best satisfy a selected criterion. Also known as system optimization." by McGraw–Hill Dictionary of Scientific and Technical Terms, Fourth Edition, page 1329, 1989.

14. **"Simulation"** is defined as "the imitation of the operation of a real-world process or system over time. Simulation involves the generation of an artificial history of the system and the observation of that artificial history to draw inferences concerning the operating characteristics of the real system that is represented. Simulation is an indispensable problem-solving methodology for the solution of many real-world problems. Simulation is used to describe and analyze the behavior of a system, ask what-if questions about the real system, and aid in the design of real systems. Both existing and conceptual systems can be modeled with simulation." by The Handbook of Simulation, Jerry Banks, 1998, pages 3-4.

15. **"Tagging"** is defined as "applying unique identifiers to the topological entities (e.g., solid bodies, faces, edges, etc.) which are later to be used by the engineering analysis program to perform the analysis (see block 140). Typically the tags can be names or name-value pairs, where the names and values will have some meaning for the engineering analysis program. For example, a name tiled Pressure_Face may be used for a face where the engineering analysis code needs to apply a pressure...." at Specification page 5.

16. **"Trimming"** is defined as "cut away parts of the associative copy of the geometry that are not needed for engineering analysis" at Specification page 5.

Knowledge based expert systems

17. As a preface to the 35 USC 112 rejections, it appears useful to review three examples of knowledge based expert systems, as well as the relevant cases and burdens.

18. DEFINITION. The claimed invention appears to be a relatively low-level expert system. An "expert system" is defined by Microsoft Computer Dictionary as "An application program that makes decisions or solves problems in a particular field, such as finance or medicine, by using knowledge and analytical rules defined by experts in the field. It uses two components, a knowledge base and an inference engine, to form conclusions... See also artificial intelligence, inference engine, intelligent database, knowledge base."

19. THREE EXAMPLES. The complexity of early expert systems is discussed by Time-Life Artificial Intelligence (copyright 1986) at page 40 "With considerable help and encouragement from Feigenbaum and his colleague Bruce Buchanan, another Stanford research scientist, Shortliffe devised an expert system dubbed MYCIN. Armed with some 500 if-then rules for diagnosing meningitis and blood infections and recommending antibiotic therapies".

20. A second expert system is discussed at page 41, "CADUCEUS-which was named for the traditional winged-staff-and-serpent symbol of physicians-began in the early 1970s. Its goal is to encompass the essential diagnostic knowledge of some 700 diseases. With Jack Meyers serving as an important source of the system's expertise, it is perhaps unsurprising that CADUCEUS acquired the nickname Jack-in-the-Box.... Systems such as CADUCEUS are severely limited by the size of their knowledge bases."

21. A third expert system is discussed at page 41, "Aldo Cimino... expert in maintaining the complex sterilizers, or "cookers," used for killing bacteria in canned soup... spent about seven months with Michael Smith, a so called knowledge engineer-a computer scientist who tries to reduce complex subjects to the if-then formant that can be processed by an expert system ... more than 150 rules of thumb to aid the operators of Cambell's sterilizers". Note that two experts spent seven months (or 14 man-months, or more than 1 man-year) to generate 150 if-then rules.

22. LEGAL PRECEDENT. For the record, note two useful cases regarding enablement. *White Consolidated Industries, Inc. v. Vega Servo-Control Inc.* (CAFC) 218 USPQ 961, 963 (7/25/83) addresses software enablement and states "The amount of required experimentation, however, must be reasonable" and "in this case that development of a single

pass language translator would require from 1-1/2 to 2 manyears of effort, a clearly
unreasonable requirement".

23. Also note that *In re Wands* (CA FC) 8 USPQ2d 1400, 1404 (9/30/1998) provides an 8 factor
test for determining undue experimentation: "Factors to be considered in determining
whether a disclosure would require undue experimentation...includes (1) the quantity of
experimentation necessary, (2) the amount of direction or guidance presented, (3) the
presence or absence of working examples, (4) the nature of the invention, (5) the state of the
prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of
the art, and (8) the breadth of the claims".

24. MPEP BURDENS. Examiner bears "the initial burden to establish a reasonable basis to
question the enablement" according to MPEP 2164.04. The burden then shifts to the
Applicant to "present persuasive arguments, supported by suitable proofs where necessary",
see MPEP § 2164.05. The standard for the Applicant's arguments is "<u>convincing</u> to one
skilled in the art", see MPEP § 2164.05.

35 USC § 112- first paragraph- enablement

25. The following is a quotation of the first paragraph of 35 U.S.C. 112: The specification shall contain a written
description of the invention, and of the manner and process of making and using it, in such full, clear, concise,
and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly
connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying
out his invention.

26. Claims 1-20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter
which was not described in the specification in such a way as to enable one skilled in the art
to which it pertains, or with which it is most nearly connected, to make and/or use the
invention.

27. Claim 1 states **"providing a master model and a context model specification"**. However,
FIG 1 shows "PROVIDE A MASTER MODEL", and does not show providing a context
model.

28. Also, claim 1 states **"creating a context model from said master model and said context
model specification"**. However, FIG 1 shows creating a context model from the master
model, and does not show the claim. See Specification pages 2-6.

29. Additionally, claim 1 appears to treat "context model specification" as a different entity from "context model", but FIG 1 only shows one entity labeled "context model". See Specification pages 2-6.

30. Additionally, claim 1 **"automatically analyzing... providing... modifying... chunking... trimming"** and so forth is not enabled because it claims an expert system without providing adequate rules. For example, no rules are provided for modifying the model. Similarly, no rules are provided for "chunking" or "trimming". Deciding which features are not essential to the model and may be trimmed is a very complex and difficult task. Similarly, "analyzing" using finite element analysis is a very complex and difficult task. See discussion above about the difficulty of developing expert systems. Note that it took 14 man-months to develop 150 rules for sterilizing soup. **Turbine engines are much more complex than soup.**

31. Claims 2-20 are rejected for the same reasons as claim 1.

35 USC § 112-Second Paragraph-indefinite claims

32. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

33. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

34. Claim 1 states "providing a master model and a context model specification". However, FIG 1 shows "PROVIDE A MASTER MODEL", and does not show providing a context model.

35. Also, claim 1 states "creating a context model from said master model and said context model specification". However, FIG 1 shows creating a context model from the master model, and does not show the claim. See Specification pages 2-6.

36. Additionally, claim 1 appears to treat "context model specification" as a different entity from "context model", but FIG 1 only shows one entity labeled "context model". See Specification pages 2-6.

37. Claims 2-20 are rejected for the same reasons as claim 1.

35 USC § 102(e): filed after 11/29/00, or vol. pub. under 35 USD 122(b)

38. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the
rejections under this section made in this Office action: A person shall be entitled to a patent unless – (e) the
invention was described in- (1) an application for patent, published under section 122(b), by another filed in the
United States before the invention by the applicant for patent, except that an international application filed
under the treaty defined in section 351(a) shall have the effect under this subsection of a national application
published under section 122(b) only if the international application designating the United States was published
under Article 21(2)(a) of such treaty in the English language; or (2) a patent granted on an application for patent
by another filed in the United States before the invention by the applicant for patent, except that a patent shall
not be deemed filed in the United States for the purposes of this subsection based on the filing of an
international application filed under the treaty defined in section 351(a).

39. <u>Claims 1 and 7 are rejected</u> under 35 USC 102(e) as anticipated by Rassaian US patent
6,813,749.

40. Claim 1 is an independent "method" claim with 5 limitations.

41. In claim 1 limitation (a), **"providing a master model and a context model specification"** is
disclosed by Rassaian FIG 1 "Start" and "Component Design".

42. In claim 1 limitation (b), **"creating a context model from said master model and said
context model specification"** is disclosed by Rassaian FIG 1 "3D Component Model".

43. In claim 1 limitation (c), **"translating said context model into an engineering analysis
model compatible with an engineering analysis program"** is disclosed by Rassaian FIG 1
"Crate Analysis Files".

44. In claim 1 limitation (d), **"executing said engineering analysis program to generates a
performance estimate from said engineering analysis model"** is disclosed by Rassaian
FIG 1 "Perform Thermal/Structural FEA".

45. In claim 1 limitation (e), **"optionally modifying said master model to improve said
performance estimate"** is disclosed by Rassaian FIG 1 "Modification Prompt".

46. In claim 7, **"finite element method"** is disclosed by Rassaian FIG 1 "Perform
Thermal/Structural FEA".

Claim Rejections - 35 USC § 103

47. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in
this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or
described as set forth in section 102 of this title, if the differences between the subject matter sought to be

patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

48. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: Determining the scope and contents of the prior art. Ascertaining the differences between the prior art and the claims at issue. Resolving the level of ordinary skill in the pertinent art. Considering objective evidence present in the application indicating obviousness or nonobviousness.

49. Claims 2-6, 8, and 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable.

50. <u>Claims 2-6, and 8 are rejected</u> under 35 U.S.C. 103(a) as being unpatentable over Rassaian US patent 6,813,749 in view of Official Notice.

51. Dependent claims 2-6, and 8 depend from claim 1, with the following additional limitations.

52. In claim 2, **"associative copy"** is disclosed by Official Notice.

53. The Examiner takes Official Notice that **associative copies, chunking, trimming, tagging, macros and finite difference** are standard CAD/CAM/CAE techniques that are well known to one of ordinary skill in the art who is familiar with the related commercial software packages. For example, note the discussion of Unigraphics ™ at Specification page 2, and ProE ™ and CATIA ™ and I-DEAS ™ and ANSYS, ™ and ABAQUES ™ and Star-CD ™ at Specification page 3, and iSIGT ™ and ModelCenter ™ at Specification page 4.

54. The Applicant is entitled to traverse the official notice according to MPEP § 2144.03. However, note that MPEP § 2144.03 also states "To adequately traverse such a finding, an applicant must specifically point out the supposed errors in the examiner's action, which would include stating why the noticed fact is not considered to be common knowledge or well-known in the art. See 37 CFR 1.111(b). See also *Chevenard,* 139 F.2d at 713, 60 USPQ at 241 ("[I]n the absence of any demand by appellant for the examiner to produce authority for his statement, we will not consider this contention."). A general allegation that the claims define a patentable invention without any reference to the examiner's assertion of official notice would be inadequate."

55. Additionally, *In re Boon*, 439 F.2d 724, 169 USPQ 231, 234 (CCPA 1971) states "as we held in Ahlert, an applicant must be given the opportunity to challenge either the correctness of the fact asserted or the notoriety or repute of the reference cited in support of the assertion.

We did not mean to imply by this statement that a bald challenge, with nothing more, would be all that was needed". Also note that 37 CFR § 1.671(c)(3) states "Judicial notice means official notice". Further, MPEP § 2144.03 states "If applicant does not traverse the examiner's assertion of official notice or applicant's traverse is not adequate, the examiner should clearly indicate in the next Office action that the common knowledge or well-known in the art statement is taken to be admitted prior art because applicant either failed to traverse the examiner's assertion of official notice or that the traverse was inadequate."

56. In conclusion, a mere bald challenge will be interpreted as an inadequate traversal, and then the official notice will be taken as admitted prior art.

57. In claim 3, **"chunking"** is disclosed by Official Notice that associative copies, chunking, trimming, tagging, macros and finite difference are standard CAD/CAM/CAE techniques.

58. In claim 4, **"trimming"** is disclosed by Official Notice that associative copies, chunking, trimming, tagging, macros and finite difference are standard CAD/CAM/CAE techniques.

59. In claim 5, **"tagging"** is disclosed by Official Notice that associative copies, chunking, trimming, tagging, macros and finite difference are standard CAD/CAM/CAE techniques.

60. In claim 6, **"macro file"** is disclosed by Official Notice that associative copies, chunking, trimming, tagging, macros and finite difference are standard CAD/CAM/CAE techniques.

61. In claim 8, **"finite difference method"** is disclosed by Official Notice that associative copies, chunking, trimming, tagging, macros and finite difference are standard CAD/CAM/CAE techniques.

62. MOTIVATION FOR CLAIMS 2-6 AND 8. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Official Notice to modify Rassaian. One of ordinary skill in the art would have been motivated to do this in order to apply standard CAD/CAD/CAE techniques to perform Rassaian's finite element analysis efficiently and effectively. For example, associative copies are standard for version control, and for simultaneously exploring multiple variations of a basic design.

63. <u>Claims 9 and 10 are rejected</u> under 35 U.S.C. 103(a) as being unpatentable over Rassaian US patent 6,813,749 in view Marcos US Patent 5,133,182.

64. Claims 9 and 10 depend from independent claim 1, with the following additional limitations.

65. In claim 9, **"compressor spool"** is disclosed by Marcos Abstract "fan jet engine... twin spools" and FIG 2a.

66. In claim 10, **"multiple disks and adjacent rotating hardware"** is disclosed by Marcos Abstract "fan jet engine... twin spools" and FIG 2a.

67. MOTIVATION FOR CLAIMS 9 and 10. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Marcos to modify Rassaian. One of ordinary skill in the art would have been motivated to do this in order to apply the advanced finite elements methods of Rassaian to solve the complex fan jet engines of Marcos, because Marcos jet engines are too complex to be solved by analytical methods. Iterative methods such as finite element are necessary to reach solutions.

68. Claims 11-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rassaian US patent 6,813,749 in view Official Notice and Marcos US Patent 5,133,182.

69. Claims 11-20 contain the same limitations as claims 1-10 above, and are rejected for the same reasons.

70. MOTIVATION FOR CLAIMS 11-20. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Official Notice and Marcos to modify Rassaian. One of ordinary skill in the art would have been motivated to do this in order to apply standard CAD/CAD/CAE techniques to perform Rassaian's finite element analysis efficiently and effectively. For example, associative copies are standard for version control, and for simultaneously exploring multiple variations of a basic design. Additionally, one of ordinary skill in the art would have been motivated to apply the advanced finite elements methods of Rassaian to solve the complex fan jet engines of Marcos, because Marcos jet engines are too complex to be solved by analytical methods. Iterative methods such as finite element are necessary to reach solutions.

Additional Cited Prior Art

71. The following US patents or publications are hereby cited as prior art, but have not been used for rejection. Applicant should review these carefully before responding to this office action. Sebastian US Patent Re. 36,602 discloses "A computer-based engineering design system" at Abstract.
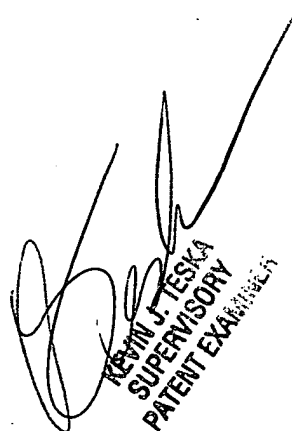
Conclusion

72. All pending claims stand rejected.

Communication

73. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 571-272-3711. The examiner can normally be reached on Monday through Thursday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at 571-272-3761. The fax phone number for this group is 703-872-9306.

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